The credibility of the European Central Bank (with comment by B.T. McCallum)

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THE CREDIBILITY OF THE EUROPEAN CENTRAL BANK

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10.1 INTRODUCTION

According to the Maastricht Treaty signed in December 1991, a European System of Central Banks (ESCB) is to be established at the latest on 1 January 1999, consisting of the European Central Bank (ECB) and the national central banks of all member states of the European Union. The Treaty, together with the Protocol on the Statute of the ESCB and of the ECB, provides a solid legislative base for the common monetary policy in Economic and Monetary Union (EMU). Furthermore, it spells out various provisions to guarantee the independence of the ESCB and ECB. Their statutes are largely modelled on the law governing the Deutsche Bundesbank. First, the primary objective of the ESCB will be to maintain price stability. Without impairing this primary objective, the ESCB also has to support the general economic policies in the Union. Second, the governing council of the ECB, comprising the members of the executive board and the governors of the national central banks, of countries without a derogation, will formulate monetary policy within EMU. The executive board consists of the president, the vice-president and four other members and will implement European monetary policy. Its members will be appointed by the heads of state or of government, on a recommendation from the European Council, after consulting the European Parliament and the governing council of the ECB. Their term of office will be eight years and their mandate is not renewable. Third,

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neither the ECB nor any national central bank is to seek or take instructions from institutions of the Union, from any government or from any other body. Each national central bank has to be independent at the latest at the date of the establishment of the ESCB. This implies, among other things, that the governor of each national central bank will have a minimum term of office of five years and can only be removed from office if he or she no longer fulfils the conditions required for performance as a governor or has been guilty of serious misconduct.

However, it should be stressed that the ECB has no obligatory policy target(s) regarding money growth or inflation. Some central banks, like the Bundesbank, have chosen to monitor and target the growth of a broad monetary aggregate (i.e. M3) and propose the same as a rule of conduct for the ECB. Other central banks, such as the Bank of England, have set out a new framework for monetary policy by announcing explicit inflation targets and propagating these targets for the ECB.[1]

This chapter deals with the following fundamental questions. First, it tries to explain the optimal degree of central bank *independence and conservativeness* by four economic and political determinants (the natural rate of unemployment, society's preferences for unemployment stabilization relative to inflation stabilization, the variance of productivity shocks and the benefits of unanticipated inflation) both theoretically and empirically. The empirical results are only given for the (twelve) member states of the European Union.[2] Second, I want to identify the optimal degree of *conservativeness* of the ECB in the case of different groups of countries constituting EMU. The countries making up EMU in 1999 may vary from a small *core* group (e.g. Austria, France, Germany and the Netherlands) to *all* member states of the Union. Given the complete independence of the ECB – which is comparable with the autonomy of the Bundesbank – we are able to determine the optimal conservativeness of the ECB on the basis of the weighted averages of the economic and political determinants and, thereby, of the optimal conservativeness for the countries participating in EMU.

The chapter is organized as follows. A quick refresher on the theoretical literature of central bank conservativeness and optimal contracts is presented in section 10.2. Central bank independence is included in the model of a conservative central banker and the trade-off between independence and conservativeness is discussed in section 10.3. In this section, the relationship between (independence and) conservativeness of the ECB and the four economic and political determinants is investigated with an extension of the Rogoff (1985) model. Furthermore, I test this relation empirically with a latent variables method (LISREL) for nineteen industrial countries, including the member states of the European Union in section 10.4. The optimal degree of conservativeness of the ECB is identified for different groups of countries participating in EMU. Finally, conclusions are drawn in section 10.5.

10.2 A QUICK REFRESHER FOR CENTRAL BANKERS

Recently, in many countries both political and monetary authorities have shown an increasing interest in the objective of monetary stability and the position of the central bank. As pointed out by Eijffinger and De Haan (1995), recent policy reform, as well as historical experience, suggests two different routes to price stability.

The first way is the *legislative* approach, namely to create by law a very independent central bank with an unequivocal mandate to focus on price stability. Interest in this approach is motivated by the success of the Deutsche Bundesbank in maintaining one of the lowest rates of inflation for several decades. Moreover, France and Spain reformed their central bank laws to make the Banque de France and the Banco de España more independent of government. Furthermore, countries in Central and Eastern Europe, such as the Czech Republic, Hungary and Poland, increased the legal independence of their central banks. Finally, in Latin America there are also tendencies towards granting more independence to the central banks in countries like Argentina, Chile, Mexico and Venezuela. Academic contributions in this area are Rogoff (1985), Neumann (1991), Lohmann (1992), Eijffinger and Schaling (1993b) and Schaling (1995).

The second way is the *targeting or contracting* approach, namely to let the political principal of the central bank impose an explicit inflation target for monetary policy, and make the central bank governor explicitly accountable for his success in meeting this target. Recently, New Zealand, Canada and the United Kingdom have made some progress along this route. Along these lines New Zealand enacted legislation that increased the independence of its Reserve Bank, while in the United Kingdom there is now a lively discussion of the desirability of making the Bank of England more independent. Important theoretical work on this approach has been done by Persson and Tabellini (1993), Svensson (1995) and Walsh (1995).

Empirical work on the legislative approach (Alesina, 1988, 1989; Grilli *et al.*, 1991; Cukierman, 1992; Eijffinger and Schaling, 1992, 1993a, b; De Haan and Sturm, 1992; Alesina and Summers, 1993) has focused on the quantification of independence using a number of legal attributes from central bank laws.[3] These studies focus on the *positive* issue of the relation between monetary regimes and economic performance. Broadly speaking, the conclusion is that the more independent the central bank, the lower the inflation rate, while the rate of output growth is unaffected.

10.2.1 Central bank conservativeness

10.2.1.1 THE ROGOFF (1985) MODEL

In the Rogoff (1985) model, society can make itself better off by appointing a conservative central banker who does not share the social objective function, but instead places 'too large' a weight on inflation rate

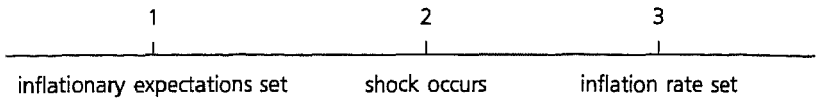

Figure 10.1 Timing of events in the Rogoff model

stabilization relative to output stabilization. In this simplified version, output is given by the Lucas supply function:

$$y_t = \pi_t - \pi^e + \mu_t \tag{1}$$

where π_t is inflation, π^e is expected inflation and μ_t is a serially uncorrelated productivity shock with mean zero and variance σ_μ^2. We set the natural level of output at zero and the parameters at one. The timing of events is as follows: first π^e is set (nominal wage contracts are signed), then the shock μ_t occurs and finally the central banker sets π_t (see Figure 10.1).

Society's loss function is given by:

$$L_t = \frac{1}{2}(\pi_t - \pi^*)^2 + \frac{\chi}{2}(y_t - y^*)^2 \tag{2}$$

where the weight on output stabilization $\chi > 0$ and $y^* > 0$, so that the desired level of output, y^*, is above the natural level. The target level of inflation is given by π^*.

Rogoff now shows that it is optimal for society to choose a conservative central banker who assigns 'too large' a weight to inflation in his loss function:

$$I_t = \frac{1+\varepsilon}{2}(\pi_t - \pi^*)^2 + \frac{\chi}{2}(y_t - y^*)^2 \tag{3}$$

where ε, the additional weight on the inflation goal, lies between zero and infinity ($0 < \varepsilon < \infty$).

Substituting (1) in (3), taking first-order conditions with respect to π_t and solving for rational expectations, we obtain:

$$\pi_t = \pi^* + \frac{\chi}{1+\varepsilon} y^* - \frac{\chi}{1+\varepsilon+\chi}\mu_t \tag{4}$$

$$\pi^e = \pi^* + \frac{\chi}{1+\varepsilon} y^* \tag{5}$$

$$y_t = \frac{1+\varepsilon}{1+\varepsilon+\chi}\mu_t \tag{6}$$

Policy rule (4) shows that the introduction of a conservative central banker

($\varepsilon > 0$) leads to a lower inflationary bias

$$\frac{\chi}{1+\varepsilon} y^*$$

and a lower variance of inflation

$$\left[\frac{\chi}{1+\varepsilon+\chi}\right]^2 \sigma_\mu^2$$

The variance of output

$$\left[\frac{1+\varepsilon}{1+\varepsilon+\chi}\right]^2 \sigma_\mu^2$$

however, is an increasing function of the conservativeness of the central banker. This is the trade-off between credibility and flexibility that is already apparent in the Rogoff model. It can be shown that the optimal value for ε, in terms of social loss function (2), is positive but finite.[4] This implies that it is optimal for society to appoint a conservative central banker.

McCallum (1995) argues that it is inappropriate to presume that the central bank follows rule (4). Even though no technology for precommitment exists, the central bank can avoid the inflationary bias by recognizing that it cannot exploit the expectations. It should simply start applying the optimal rule.

10.2.1.2 THE LOHMANN (1992) MODEL

Rogoff makes the crucial assumption that the central banker is completely independent and cannot be overridden *ex post*, when the inflationary expectations π^e have been set and the policy is to be carried out. This can lead to large losses for society when extreme productivity shocks μ_t occur. Lohmann introduces the possibility to override the central banker at a strictly positive but *finite* cost. Therefore, society's loss function (2) changes to:

$$L_t' = \frac{1}{2}(\pi_t - \pi^*)^2 + \frac{\chi}{2}(y_t - y^*)^2 + \delta c \qquad (2')$$

where δ is a dummy that takes on the value of 1 when the central bank is overridden and 0 otherwise; and c is a cost that society incurs when the central bank is overridden. The central bank's loss function (3) stays the same.

The timing of events is as follows. In the first stage the central banker's additional weight ε on the inflation goal is chosen as well as the cost c of overriding the central banker. Then the inflation expectations are set. In the third stage the productivity shock occurs. Then the central banker sets the inflation rate, which is either accepted or not. If it is not accepted, society overrides the central banker, incurs the cost c and resets the

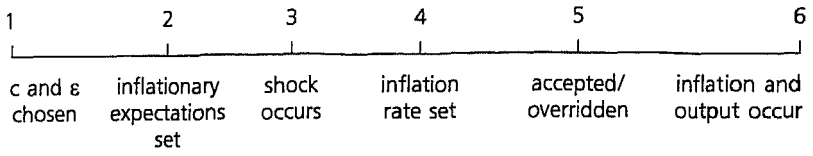

Figure 10.2 Timing of events in the Lohmann model

inflation rate. Finally, inflation and output occur (see Figure 10.2). In equilibrium, the central banker will not be overridden. In the case of an extreme productivity shock he will set the inflation rate so that society is indifferent between overriding or not.

Rogoff's model is a special case of Lohmann's, where the cost of overriding is infinite ($c = \infty$). Lohmann shows that the optimal central bank institution (ε^* and c^*) is characterized by $0 < \varepsilon^* < \infty$ and $0 < c^* < \infty$.

10.2.2 Optimal contracts for central bankers

10.2.2.1 THE WALSH (1995) MODEL

In both the Rogoff and the Lohmann models, the conservative central banker reduces the inflationary bias at the cost of less output stabilization. The optimal contract for the central banker, as described by Walsh (1995)[5] achieves the first best solution: no inflationary bias and optimal stabilization. The central banker's utility depends on the social loss and a transfer he receives: $U_t = T_t - L_t$, where U is the central banker's utility, T is the transfer and L is the social loss as in (2).

In the optimal contract, the transfer T is chosen so that the inflationary bias disappears. The transfer will typically be of the form:

$$T_t = C - \chi y^* \pi_t \tag{7}$$

where C is a constant, needed to meet the central banker's participation constraint. Abstracting from the constant, the central banker's loss function (3) changes to:

$$l'_t = \frac{1}{2}(\pi_t - \pi^*)^2 + \frac{\chi}{2}(y_t - y^*)^2 + \chi y^* \pi_t \tag{3'}$$

The central banker will set the following (optimal) policy rule:

$$\pi_t = \pi^* - \frac{\chi}{1+\chi}\mu_t \tag{4'}$$

The expected inflation $\pi^e = \pi^*$ and output is given by:

$$y_t = \frac{1}{1+\chi}\mu_t \tag{6'}$$

From (6') it is clear that the variance of output is smaller than in the Rogoff model.

As pointed out by McCallum (1995), the problem with this result is that the government has no incentive to enforce the contract when inflation is high. The government will still try to induce the central bank to be more expansionary when unemployment is high, e.g. by giving rewards to the central bank when it accommodates.

When the model is extended to allow for output persistence, the supply function changes to:[6]

$$y_t = \rho y_{t-1} + \pi_t - \pi^e + \mu_t \tag{1'}$$

with ρ the persistence parameter ($0 < \rho < 1$).

We also generalize the social loss function (2) to:

$$V = E_0 \left[\sum_{t=1}^{\infty} \beta^{t-1} l_t\right] \tag{2'}$$

where E_0 denotes expectations at $t = 0$ and β is the discount rate.

Under discretion, the following expression for the inflation rate can be derived:

$$\pi_t = \pi^* + \frac{\chi y^*}{1 - \beta\rho - \beta\hat{c}} - \hat{c} y_{t-1} - \frac{\chi + \beta\hat{c}^2}{1 + \chi - \beta\rho^2 + \beta\hat{c}^2}\mu_t \tag{8}$$

where $\hat{c} = \frac{1}{2\beta\rho}\left[1 - \beta\rho^2 - \sqrt{(1 - \beta\rho^2)^2 - 4\chi\beta\rho^2}\right] > 0$

The inflationary bias in (8) depends on past output and is therefore state-dependent. The average inflationary bias is $(\chi y^*/(1 - \beta\rho - \beta\hat{c}))$, which is larger than in the case without output persistence. Also, the response to supply shocks, as in the last term of (8), is larger than in the optimal rule. In the optimal rule, the response to the supply shock is given by

$$\frac{\chi}{1 + \chi - \beta\rho^2}\mu_t$$

When the central banker's loss function is changed in the way Walsh proposes, by adding a cost term that is linear in inflation, we get the following:

$$V^b = E_0 \left[\sum_{t=1}^{\infty} \beta^{t-1} l^b_t\right] \tag{9}$$

with

$$l^b_t = \frac{1}{2}(\pi_t - \pi^*)^2 + \frac{\chi}{2}(y_t - y^*)^2 + \frac{\chi y^*}{1 - \beta\rho - \beta\hat{c}}\pi_t \tag{10}$$

This constant linear inflation contract eliminates the average inflationary bias, but not the state-contingent part of it, and the response to supply shocks remains stronger than the optimal. The state-contingent part of the inflationary bias can be eliminated when we allow for state-contingent linear inflation contracts (so dependent on past output). Then, we can achieve the first best solution.

10.2.2.2 THE SVENSSON (1995) MODEL

Yet another way to achieve the first best solution is suggested by Svensson (1995). In his model, an explicit inflation target is assigned to the central banker that may differ from the socially best inflation target. In the simple set-up used here, an inflation target of $\pi^* - \chi y^*$ (which offsets the inflationary bias in the discretionary model) for the central banker will do the trick and gives the same results as Walsh's model.

The central bank's loss function (3) changes to:

$$L''_t = \frac{1}{2}(\pi_t - \pi^b)^2 + \frac{\chi}{2}(y_t - y^*)^2 \qquad (3'')$$

where the central bank's inflation target $\pi^b = \pi^* - \chi y^*$.

The first-order condition that is obtained by substituting (1) into (3'') and differentiating with respect to π_t is the same in the Svensson model as in the Walsh model. Both add the same constant marginal cost of inflation to the central banker's loss function.

In the case with output persistence, assigning an explicit constant inflation target to the central banker gives the same result as in the Walsh model with a constant linear inflation contract. The central banker's loss function will then look like:

$$V^b = E_0 \left[\sum_{t=1}^{\infty} \beta^{t-1} L''_t\right] \qquad (9')$$

with L''_t as in (3'') and

$$\Pi^b = \Pi^* - \frac{\chi y^*}{1 - \beta\rho - \beta\hat{c}}$$

However, a state-contingent inflation target for the central banker does not immediately yield the first best solution. The inflationary bias can be eliminated, but the response to the supply shock stays the same as in the model with the constant inflation target. So the response to supply shocks is too strong. This can be eliminated by choosing a conservative banker *à la* Rogoff. Then the first best solution can also be reached with a state-contingent inflation target.

10.3 FROM CONSERVATIVENESS TO INDEPENDENCE

The independence of a central bank can be seen as the extent to which it determines monetary policy without interference of the government. In the Rogoff model, this can be incorporated in the loss function that determines monetary policy, M_t. This function is a *weighted* average of the central bank's loss function I_t and society's loss function L_t where the weight $0 < \gamma < 1$ is the degree of central bank independence:[7]

$$M_t = \gamma I_t + (1 - \gamma) L_t \tag{11}$$

Substituting society's loss function (2) and central bank's loss function (3) into (11) gives:

$$M_t = \frac{1 + \gamma\varepsilon}{2}(\pi_t - \pi^*)^2 + \frac{\chi}{2}(y_t - y^*)^2 \tag{11'}$$

So, what matters for monetary policy is $\gamma\varepsilon$: the *product* of independence and conservativeness of the central bank. There is an optimal degree of independence and conservativeness ($\gamma\varepsilon^*$) which minimizes M_t (as illustrated in Figure 10.3). In practice, the degree of (legal) independence of a central bank is fixed as measured by the legal indices of independence which reflect the central bank laws in various countries. The level of conservativeness, however, can generally be chosen by the central bank. Hence, a lack of central bank independence can be compensated for by the choice of more conservative central bankers. Given the *actual* degree of independence, we are able to identify the *optimal* degree of conservativeness on the basis of economic and political determinants.

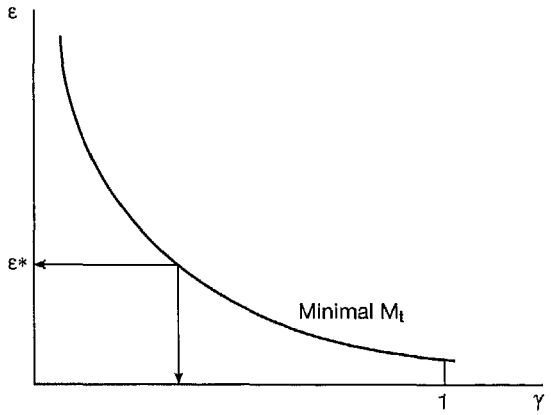

Figure 10.3 The trade-off between conservativeness and independence

10.3.1 The optimal conservativeness of the European Central Bank

This brings us to a key issue in the political economy of central banking: the relationship between institutional design and individual and collective preferences. Here the question to be dealt with is the *normative* issue of how conservative the ECB should be, i.e. the optimal degree of conservativeness of the ECB.

An important study in this field is Cukierman (1994). Building on the seminal paper of Lohmann (1992), he wants to identify the economic and political factors that induce politicians to delegate more or less authority to the central bank. His theory predicts that central bank independence will be higher, the larger the employment-motivated inflationary bias, the higher political instability and the larger the government debt are.

These predictions were tested and, subsequently, rejected by De Haan and Van 't Hag (1994) using regression analysis (OLS method). In testing Cukierman's model, they employ measures of central bank independence that – in Rogoff's (1985) terminology – reflect the strength of the 'conservative bias' of the central bank as embodied in the law. In Cukierman's model, following Lohmann (1992), central bank independence is defined as the *cost of overriding* the central bank, rather than as the degree of *conservativeness*. Cukierman's (1994) theory also generates propositions about *optimal* regimes, while the legal measures describe *actual* monetary regimes.

In this chapter I try to overcome these pitfalls. Building on the Rogoff (1985) model, I distinguish between independence and conservativeness of the ECB. Using a graphical method, I develop a new way of determining the optimal degree of conservativeness.[8] As in Lohmann (1992), this degree depends on the balance between *credibility* and *flexibility*. However, unlike Rogoff and Lohmann, I am able to express the upper and lower bounds of the interval containing the optimal degree of conservativeness in terms of the structural parameters of the model.

Furthermore, I derive a number of propositions concerning the relation between economic and political factors and the optimal degree of conservativeness of the ECB. I show that optimal central bank conservativeness is higher, the higher the natural rate of unemployment, the greater the benefits of unanticipated inflation (the slope of the Phillips curve), the less inflation-averse society and the smaller the variance of productivity shocks.

In order to investigate the determinants of the optimal degree of conservativeness for a given level of independence, I extend the bare bones of the Rogoff model as presented in section 10.2 with the slope of the Phillips curve. This means that the Lucas supply function (1) changes to:

$$y_t = \theta(\pi_t - \pi^e + \mu_t) \qquad (1'')$$

where $\theta > 0$ denotes the slope of the Phillips curve.[9]

Furthermore, we assume that the target level of output, y*, corresponds

to full employment and that the natural rate of unemployment, i.e. the rate of unemployment that results when output is at its natural level, is positive, $\tilde{u} > 0$. The level of unemployment u_t is now determined by:

$$u_t = \tilde{u} - \theta(\pi_t - \pi^e + \mu_t) \tag{12}$$

Finally, the target level of inflation is normalized to zero, $\pi^* = 0$. This changes the loss function of society to:

$$L_t = \frac{1}{2}\pi^2{}_t + \frac{\chi}{2}u_t^2 \tag{13}$$

The loss function that determines monetary policy now becomes:

$$M_t = \frac{1+\gamma\varepsilon}{2}\pi^2{}_t + \frac{\chi}{2}u_t^2 \tag{11'}$$

Assuming the ECB to be a completely independent central bank,[10] we set the independence parameter at one ($\gamma = 1$). Then, the loss function that determines monetary policy is equal to the loss function of the ECB and becomes:

$$M_t = \frac{1+\varepsilon}{2}\pi^2{}_t + \frac{\chi}{2}u^2{}_t \tag{14}$$

The rate of inflation that results when substituting (12) into (11'), taking first-order conditions with respect to π_t and solving for rational expectations is:

$$\pi_t = \frac{\chi\theta}{1+\varepsilon}\tilde{u} - \frac{\theta^2\chi}{1+\varepsilon+\theta^2\chi}\mu_t \tag{4''}$$

Substituting (4'') into (12) gives the following expression for unemployment:

$$u_t = \tilde{u} - \frac{\theta(1+\varepsilon)}{1+\varepsilon+\theta^2\chi}\mu_t \tag{12'}$$

Society's expected loss with a fully independent central banker with conservativeness ε is:

$$E_{t-1}L_t = \frac{\chi^2\theta^2\tilde{u}^2}{2(1+\varepsilon)^2} + \frac{\theta^4\chi^2}{2(1+\varepsilon+\theta^2\chi)^2}\sigma^2{}_\mu + \frac{\chi\tilde{u}^2}{2} + \frac{\theta^2(1+\varepsilon)^2\chi}{2(1+\varepsilon+\theta^2\chi)^2}\sigma^2{}_\mu \tag{15}$$

The first term in (15) is due to the inflationary bias and can be reduced by making the central bank more conservative (a larger ε). The second term measures how well the central bank manages to keep inflation constant. This variance can also be reduced by making the central bank more

conservative. The third term is a deadweight loss owing to the natural rate of unemployment. Obviously, this cannot be reduced through monetary policy. The last term is the variance of unemployment (or output). This term increases when the central bank becomes more conservative. When we drop the deadweight loss and take the two variances together, we get the following:

$$E_{t-1}L_t = \underbrace{\frac{\chi^2\theta^2\tilde{u}^2}{2(1+\varepsilon)^2}}_{\textit{credibility}} + \underbrace{\frac{\chi\theta^2((1+\varepsilon)^2+\theta^2\chi)}{2(1+\varepsilon+\theta^2\chi)^2}\sigma^2_{\mu}}_{\textit{flexibility}} \tag{15'}$$

The first term in (15') can be seen as the *credibility* component in the social loss and the second term is the *flexibility* component in the social loss.

Minimizing the expected social loss with respect to ε yields the following first-order condition:

$$\frac{\delta E_{t-1}L_t}{\delta\varepsilon} = \underbrace{\frac{-\chi^2\theta^2\tilde{u}^2}{(1+\varepsilon)^3}}_{\textit{negative}} + \underbrace{\frac{\chi^2\theta^4\varepsilon\sigma^2_{\mu}}{(1+\varepsilon+\chi\theta^2)^3}}_{\textit{positive}} = 0 \tag{16}$$

The first term in (16) is always *negative* and reflects the credibility effect of a more conservative central bank: a higher ε reduces society's credibility problem. The second term is always *positive* and reflects the flexibility effect of more central bank conservativeness: a higher ε means less stabilization.

10.3.2 The determinants of optimal conservativeness

In Eijffinger and Schaling (1995a) it is shown that a unique solution for the optimal ε exists. Furthermore, the comparative static properties of this equilibrium are derived by means of a graphical method as is illustrated in Figure 10.4. First, the first-order condition (16) is rewritten as:

$$\varepsilon = \frac{\tilde{u}^2\,(1+\varepsilon+\chi\theta^2)^3}{\sigma^2_{\mu}\theta^2\,(1+\varepsilon)^3} \equiv F(\varepsilon) \tag{17}$$

The function F on the right-hand side of equation (17) is monotonically decreasing in ε. The left-hand side is a 45° line through the origin and the intersection point gives the optimal degree of conservativeness ε^*. The comparative static properties of the optimal degree of conservativeness can be derived from the partial derivatives of the function F. If F shifts upward, the intersection point shifts to the right.[11]

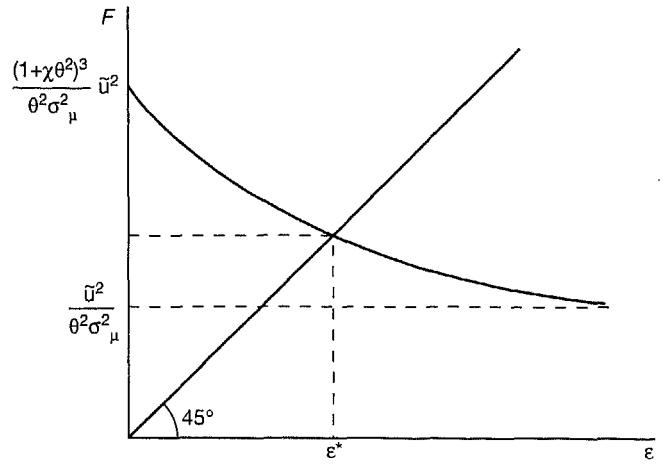

Figure 10.4 The optimal degree of conservativeness

It turns out that the higher the *European natural rate of unemployment* (the higher $\tilde{u}$), the higher the optimal degree of conservativeness of the ECB. The intuition behind this result is the following. A higher natural rate of unemployment implies a higher time-consistent rate of inflation (see equation 4″) and, consequently, a higher credibility component of the social loss function. This means that society's credibility problem increases. Hence, with an unaltered relative weight placed on inflation versus unemployment stabilization the monetary authorities' commitment to fight inflation is now too low.

The higher *society's preferences for unemployment stabilization relative to inflation stabilization* (the higher χ) in the European Union, the higher the optimal degree of conservativeness of the ECB. The underlying intuition is that, if European citizens become more concerned with unemployment and more lax about inflation, the time-consistent inflation rate goes up (see equation 4″). Therefore, society's credibility problem becomes more pressing. With an unchanged relative weight placed on inflation stabilization, the balance between credibility and flexibility needs to be adjusted in favour of increased commitment to fight inflation.

The higher the *variance of productivity shocks* (the higher σ_μ^2) in the European Union, the lower the optimal degree of conservativeness of the ECB. This result may be explained as follows. If the variance of productivity shocks increases, *ceteris paribus*, the economy becomes more unstable. Thus, the need for active stabilization policy increases (the flexibility component of the social loss function goes up). With an unaltered relative weight placed on inflation stabilization the balance between credibility and flexibility needs to be shifted towards more monetary accommodation.

If society is relatively unconcerned with inflation

$$\chi > \frac{(1+\varepsilon)}{2\theta^2}$$

the greater the *benefits of unanticipated inflation* (the higher θ) in the European Union, the higher the optimal degree of conservativeness of the ECB. The intuition behind this proposition is that, if the benefits of unanticipated inflation rise (see equation 12), it becomes more tempting to inflate the economy. Therefore, society's credibility problem gains in importance. With the same emphasis on inflation stabilization, the balance between credibility and flexibility needs to be shifted towards increased commitment to price stability.[12]

10.4. EMPIRICAL EVIDENCE ON THE OPTIMAL CONSERVATIVENESS

In this section, the economic and political determinants of the optimal degree of central bank conservativeness and independence ($\gamma\varepsilon^*$) discussed before are empirically investigated. We will use, for that purpose, the latent variables method (LISREL) to make a distinction between the *optimal* and *actual* degree of conservativeness and independence.[13] The reasons for this distinction are two-fold. First, the propositions derived in the former section are related to the optimal degree of conservativeness and independence and *not* to the actual degree. These propositions formulate the relationship between the optimal degree and four economic and political factors in a country:

- the natural rate of unemployment ($\tilde{u}$);
- society's preferences for unemployment stabilization relative to inflation stabilization (χ);
- the variance of productivity shocks (σ_μ^2); and
- the slope of the Phillips curve (θ).

These determinants, reflecting the economic and political structure of a country, explain theoretically the optimal degree of conservativeness and independence in that country.[14]

Second, there is also an identification and measurement problem. Whereas the determinants will change *frequently* during the sample period, i.e. the period 1960–93, the actual degree may change much less in the same period. The stickiness may, for example, result from the fact that central bank laws were *very occasionally* adjusted in the industrial countries during the post-war period.

The actual degree of central bank independence is approximated by the *legal* degree, according to the four main indices of central bank independence in the literature. The index of Alesina (AL) is a narrow measure of independence and based on Alesina (1988, 1989). The total

index of political and economic independence of Grilli *et al.* (GMT) is a broad measure based on Grilli *et al.* (1991). The index of policy independence of Eijffinger and Schaling (ES) is, however, a narrow measure based on Eijffinger and Schaling (1992, 1993a) and extended by Eijffinger and Van Keulen (1995). The unweighted legal index of Cukierman (LVAU) is a very broad measure of independence and derived from Cukierman (1992). These four legal indices have been *normalized (AL, GMT, ES* and *LVAU)* so that their values range from zero to one.

For our cross-country analysis, initially, a set of nineteen industrial (OECD) countries – Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, New Zealand, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States – is taken and ranked by the above-mentioned indices.[15] The sample period that we have chosen covers more than thirty years, namely the period 1960–93 (for $\tilde{u}$ 1960–88). The argument for choosing such a long period is that it contains many political and business cycles.

10.4.1 Estimation results

Table 10.1 shows the estimation results for the optimal degree of conservativeness and independence ($\gamma\varepsilon^*$) with the latent variables method (LISREL).[16] In order to identify all parameters of the model, the restriction that the disturbance terms in the model are uncorrelated is imposed.[17] From Table 10.1, it can be seen that only one explanatory variable (θ) is significant at a 97.5 per cent confidence level. Apparently, the benefits from unanticipated inflation do play an important role. The other explanatory variables have relatively low *t*-values which could, probably, be attributed to the many restrictions still imposed on the model. Nevertheless, the model as such is not rejected according to a likelihood ratio test for the model to be of the specified structure (see the Appendix).

Therefore, we have calculated the *optimal* degree of conservativeness and independence (henceforth OCI) on the basis of the economic and political determinants for each country. Given the *actual* independence being the unweighted average of the legal indices of central bank independence (CBI), we are able to determine the optimal conservativeness *before* EMU (OCB) for the twelve member states of the European Union. If countries enter the third stage of EMU, the completely independent ECB (with CBI = 1) will take over responsibility for monetary policy from the national central banks which also have to be fully independent as of the start of Stage 3 of EMU.

Thereby, we can calculate the optimal conservativeness *after* EMU (OCA) for each individual member state and, consequently, the optimal conservativeness of the ECB for different groups of countries participating in EMU.

Table 10.1 The Optimal Conservativeness before and after EMU

Country	Indices				Normalized indices				Optimal conservativeness			
	AL	*GMT*	*ES*	*LVAU*	*AL*	*GMT*	*ES*	*LVAU*	*CBI*	*OCI*	*OCB*	*OCA*
Austria		9	3	0.58		0.60	0.50	0.85	0.65	0.45	0.70	0.45
Belgium	2	7	3	0.19	0.33	0.40	0.50	0.10	0.33	0.37	1.12	0.37
Denmark	2	8	4	0.47	0.33	0.50	0.75	0.63	0.55	0.49	0.88	0.49
Finland	2		3	0.27	0.33		0.50	0.25	0.36	0.51	1.41	0.51
France	2	7	2	0.28	0.33	0.40	0.25	0.27	0.31	0.26	0.84	0.26
Germany	4	13	5	0.66	1.00	1.00	1.00	1.00	1.00	0.46	0.46	0.46
Ireland		7		0.39		0.40		0.48	0.44	0.29	0.65	0.29
Italy	1.5	5	2	0.22	0.17	0.20	0.25	0.15	0.19	0.24	1.24	0.24
Netherlands	2	10	4	0.42	0.33	0.70	0.75	0.54	0.58	0.45	0.77	0.45
Spain	1	5	1	0.21		0.20		0.13	0.08	0.19	2.23	0.19
Sweden	2		2	0.27	0.33		0.25	0.25	0.28	0.78	2.79	0.78
United Kingdom	2	6	2	0.31	0.33	0.30	0.25	0.33	0.30	0.61	2.02	0.61

$\gamma\varepsilon^* = -0.020\ \bar{u} + 0.178\ \chi + 0.022\ \sigma^2_\mu + 0.752\ \theta \quad R^2 = 0.35$, d.f. = 15.
(−0.733) (0.728) (0.981) (2.441)

t-statistics in parentheses.
Actual central bank independence: $CBI = (AL + GMT + ES + LVAU)/4$
Optimal central bank conservativeness and independence: $OCI\ (\gamma\varepsilon^*)$
Optimal conservativeness before EMU: $OCB = OCI/CBI$
Optimal conservativeness after EMU: $OCA = OCI/I$

10.4.2 The optimal conservativeness before EMU

Rogoff (1985) has shown that society can make itself better off by appointing a 'conservative' central banker who places an *additional* weight on inflation stabilization (price stability) compared with society. From section 10.3 it is evident that central bank independence and conservativeness are (close) *substitutes* for each other. An independent central bank can afford to be less conservative than a dependent central bank. Therefore, the optimal conservativeness may be interpreted as the degree of *discretion* (flexibility) in monetary policy which can be afforded by the central bank: the lower the optimal conservativeness of the central bank, the higher the degree of discretion it can afford in monetary policy making.[18]

Furthermore, the average long-term interest rates (period 1990:1 to 1995:8) of the twelve member states of the European Union[19] – excluding Greece, Luxembourg and Portugal – can be seen as the *likelihood* according to the financial markets that these countries will enter the third stage of EMU. These long-term interest rates are a reflection of the chances of the respective countries of complying with the convergence criteria set out in the Maastricht Treaty.

If we compare the optimal conservativeness *before* EMU (OCB) and the long-term interest rates in the twelve member states as in Figure 10.5, there appears to be a significant, positive relationship between both

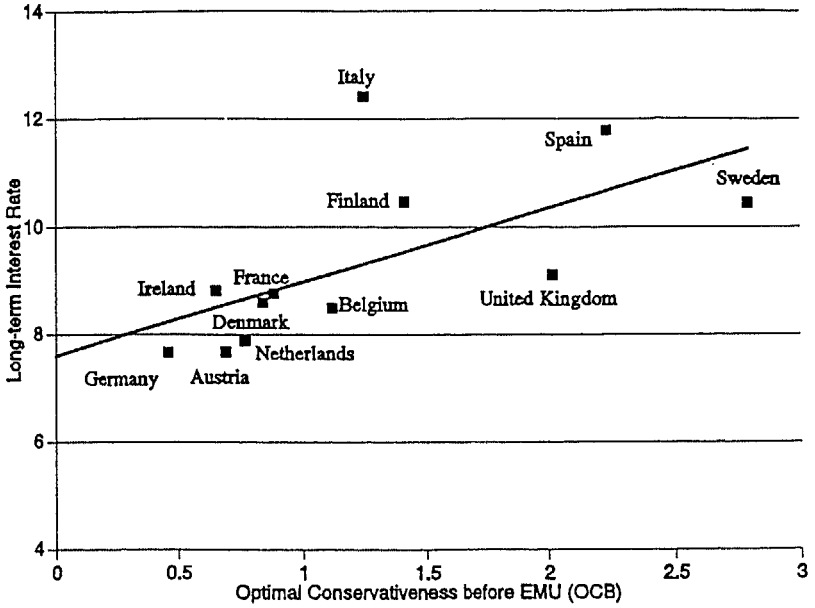

Figure 10.5 The optimal conservativeness before EMU (OCB) and long-term interest rates

Long-term interest rates = 7.60 + 1.37 OCB R^2 = 0.40, d.f. = 10
(5.889) (2.565)

variables.[20] Apparently, countries with a relatively high degree of optimal conservativeness are not considered to be likely candidates for the third stage of EMU according to the financial markets.

10.4.3 The optimal conservativeness after EMU

Figure 10.6 shows the optimal conservativeness *after* EMU (OCA) for different groups of countries. The first group consists of member states which are both *politically* and *economically* very likely (Austria, France, Germany and the Netherlands) to participate in EMU from its start in 1999.[21] This group has a weighted average optimal conservativeness for the ECB of 0.39.[22] The second group is made up of countries which are *politically* certain but *not* economically (Belgium, Finland, Italy and Spain) and has a weighted average optimal conservativeness of 0.25. The third and last group is *neither* politically, *nor* economically certain having a weighted average optimal conservativeness of 0.61.[23]

The interpretations of Figure 10.6 may be that the first group of countries does not gain much in terms of optimal conservativeness by entering the third stage of EMU because the independence of their central banks does not change a lot.

Austria, Germany and the Netherlands have already (very) independent central banks, while the Banque de France was recently given more independence by the government. However, the second group of countries gains considerably in terms of central bank independence and

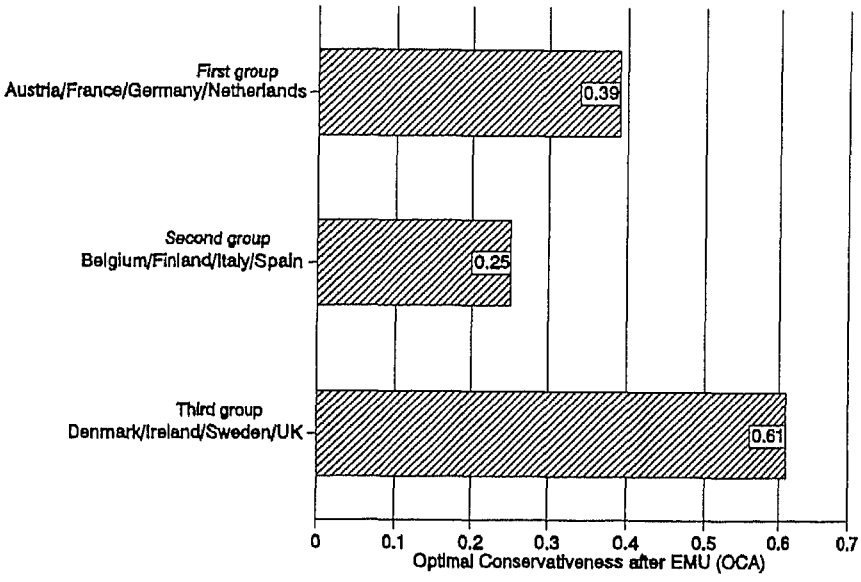

Figure 10.6 The optimal conservativeness after EMU (OCA)

can, thereby, afford to have a lower optimal conservativeness and, perhaps, lower long-term interest rates if they participate in EMU from the start. This may imply lower interest payments on government debt and, thus, lower budget deficits in these countries after EMU. So, there is an argument for letting Belgium, Finland, Italy and Spain enter the third stage as early as 1999, although they do not fully comply with the convergence criteria. Nevertheless, the third group of countries may gain in terms of central bank independence, but this gain is not sufficient to lower the optimal conservativeness of these countries after EMU. Therefore, it makes no sense for Denmark, Ireland, Sweden and the United Kingdom to participate in EMU as early as 1999.[24]

10.5 CONCLUSIONS

What are the main conclusions from the empirical evidence on the optimal conservativeness before and after EMU? First, there appears to be a clear, positive relationship between the optimal conservativeness before EMU and long-term interest rates in twelve member states of the European Union. Apparently, countries with a relatively high optimal conservativeness are not considered to be likely candidates for the third stage of EMU. Second, it makes sense from the perspective of optimal conservativeness not to limit EMU to a small core group of countries – such as Austria, France, Germany and the Netherlands – but to extend EMU to a wider group of member states, including Belgium, Finland, Italy and Spain. The argument for including these countries is that they gain a lot in terms of independence, lowering the weighted average optimal conservativeness of the ECB.

APPENDIX

The relaxation of restrictions

In the first model, we imposed the restriction that the disturbance terms in the model are uncorrelated. The statistics of this model show a likelihood ratio test for the null hypothesis that the predicted covariance matrix is of the specified structure against the alternative that the covariance matrix is unconstrained. For the first model, the null hypothesis is rejected, implying that the specified structure was not correct. Apparently, too many restrictions were imposed. Testing structural models, a univariate Lagrange multiplier test is carried out for most elements in the model matrices that are constrained to equal constants. When the test statistic, having a χ^2_1 distribution, has a value larger than 3.84 the restriction is rejected at a significance level of 5 per cent. In the first regression, with all restrictions imposed, the constraint that the disturbances of the GMT index and the variance of productivity shocks (σ_μ^2) are uncorrelated is

rejected. The test statistic has a value of 11.06 which is the highest of all restrictions. Therefore, we have lifted this restriction and tested the modified model. Now the restriction on the covariance of the GMT index and the ES index is rejected with the highest test statistic. So we lifted this restriction. The modified model gives no restriction with a test statistic higher than 3.84 and the Likelihood ratio test for the model to be of the specified structure gives a test statistic of 15.17 which is well below the critical value of 22.31 for a χ^2_{15} distribution at a significance level of 10 per cent (see Table 10.2).

Table 10.2 Table based on Estimation with Cumulative Relaxation of Restrictions

Lifted restriction	Estimated equation	R^2 and d.f.
No lifted restriction	$\gamma\varepsilon^* = -0.029\ \bar{u} + 0.064\ \chi - 0.002\ \sigma_\mu^2 + 0.572\ \theta$ $(-1.231)\ \ (0.300)\ \ (-0.078)\ \ (1.938)$	$R^2 = 0.37$ d.f. = 17
GMT, σ_μ^2	$\gamma\varepsilon^* = -0.020\ \bar{u} + 0.138\ \chi + 0.017\ \sigma_\mu^2 + 0.712\ \theta$ $(-0.795)\ \ (0.605)\ \ (0.863)\ \ (2.486)$	$R^2 = 0.37$ d.f. = 16
GMT, ES	$\gamma\varepsilon^* = -0.020\ \bar{u} + 0.178\ \chi + 0.022\ \sigma_\mu^2 + 0.752\ \theta$ $(-0.733)\ \ (0.728)\ \ (0.981)\ \ (2.441)$	$R^2 = 0.35$ d.f. = 15

Note: *t*-values in parentheses.

The data

As proxies for the ultimate determinants of the optimal degree of central bank conservativeness and independence, we have chosen the following economic and political variables. For $\bar{u}$, the *non-accelerating inflation rate of unemployment* (NAIRU) is taken from Layard, Nickell and Jackman (1991). They estimated the NAIRU for nineteen industrial countries in the period 1960–88. The proxy for society's preferences for unemployment stabilization relative to inflation stabilization (χ) is the number of years that a *left-wing (socialist) party* has been in government as a share of the *total* number of years. For a left-wing government has a higher preference for unemployment stabilization and, thereby, the optimal degree of central bank conservativeness and independence increases under a left-wing government. The variance of productivity shocks (σ_μ^2) is proxied by the *variance of output growth* (GDP) on an annual basis. We compute the slope of the Phillips curve (θ), using labour's income share in GDP. Because data for labour's income share are not available for all countries in our sample, we have taken the ratio between the *compensation of employees* paid by resident producers to resident households and GDP.

$\bar{u}$: R. Layard, S. Nickell and R. Jackman, *Unemployment, Macroeconomic Performance and the Labour Market*, Oxford, Oxford University Press, 1991. Estimates for NAIRU 1960–88, Table 14, Chapter 9.

χ: Winkler Prins Encyclopedie, 1990. A.J. Day (ed.), *Political Parties of the World*, London, Longman, 1988 (no. of years that a left-wing party has been in the government, either alone or in a coalition)/ (total no. years), 1960–93.

σ_μ^2: OECD Main Economic Indicators. Growth rate of GDP in US$ in 1985 prices and exchange rates, 1960–93.

θ: National Accounts of OECD Countries, 1960–77, 1977–89, 1978–92. 1/[1 – (compensation of employees paid by resident producers/GDP)], in current prices. OECD, Paris, 1979, 1991, 1994.

NOTES

1 See in this respect, for example, Crockett (1994), Freedman (1994) and Leiderman and Svensson (1995).

2 Eijffinger and Schaling (1995a, b) focus on nineteen industrial countries, including Australia, Canada, Japan, New Zealand, Norway, Switzerland and the United States. Eijffinger and Schaling (1995b) formulate and estimate an open economy version of the Eijffinger and Schaling (1995a) model.

3 For a collection of these contributions, see Eijffinger (1996). It should be emphasized that legal independence does not necessarily imply *actual* independence of the central bank. This point is extensively discussed by Eijffinger and De Haan (1995).

4 Rogoff uses an envelope theorem to show this. In Eijffinger and Schaling (1995a, b) a graphical method is used to determine the optimal degree of conservativeness. Eijffinger *et al.* (1995) are able to derive a closed form solution.

5 Persson and Tabellini (1993) have also elaborated the optimal contracts for central bankers.

6 See also Svensson (1995) for the extension of the Walsh (1995) model with output persistence.

7 This implies that central bank independence (γ) is defined as the degree in which the central bank determines effectively the monetary policy's loss function (M_t).

8 The theoretical analysis used here is largely based on Eijffinger and Schaling (1995a, b). However, these papers make no distinction between independence and conservativeness.

9 In Eijffinger and Schaling (1995a), $\theta = 1/(1-\beta)$, with β the labour elasticity of output in the Cobb–Douglas production function.

10 The ECB is considered to be *at least* as independent from government as the Bundesbank (see section 10.1), whereas the degree of central bank independence (γ) lies between zero (no independence) and one (full independence).

11 For a formal derivation of the properties of the function F in the first-order condition, see Appendix B in Eijffinger and Schaling (1995a).

12 Eijffinger and Schaling (1995b) provide an open economy version and find that the optimal degree of conservativeness is higher when the real exchange rate variability and the openness of the economy is smaller.

13 A clear overview of the latent variables method is given by Aigner *et al.* (1984). For an application of this method to the determinants of central bank

independence only, see Eijffinger and Schaling (1995a, b).

14 The proxies for these economic and political variables and the sources of the data are given in the Appendix.

15 By including not only twelve member states of the European Union but also seven non-member states, we have sufficient degrees of freedom to apply the latent variables method. For two member states – Greece and Portugal – no data on the natural rate of unemployment ($\bar{u}$, proxied by NAIRU) were available, whereas Luxembourg has a monetary union with Belgium.

16 The idea behind LISREL (linear structural relations) is to compare a sample covariance matrix with the parametric structure imposed on it by the hypothesized model. Under normality, LISREL delivers full information maximum likelihood (FIML) estimates of the model parameters. See also Aigner *et al.* (1984).

17 Two of these restrictions, however, have to be rejected according to a univariate Lagrange multiplier test and are, thereby, lifted. For the relaxation of the restrictions, see the Appendix.

18 See also the comparison between German and Italian monetary policy by Fratianni and Huang (1995). They conclude that the Bundesbank could afford during the period 1984–94 more deviations from their monetary targets than the Banca d'Italia by its higher reputation.

19 The long-term interest rates are taken from OECD Main Economic Indicators, 1995.

20 The coefficient for OCB (see Figure 10.5) is significant at a 97.5 per cent confidence level.

21 It is assumed that there will be some degree of political interpretation of the convergence criterion for government debt (60 per cent of GDP).

22 The weights are determined by the relative gross domestic product (GDP) in these countries during the period 1990–3. Of course, one might argue that establishing EMU constitutes a structural break regarding the optimal conservativeness in the participating member states. Furthermore, it could be argued that the weighted average optimal conservativeness after EMU also depends on the relation between individual countries' conservativeness.

23 The relative weights according to GDP (period 1990–3) of the first, second and third groups are respectively 0.52, 0.20 and 0.28.

24 The weighted average optimal conservativeness of the ECB is for the first and second groups 0.35 and for all twelve member states 0.42 respectively.

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11

COMMENT ON CHAPTER 10

Bennett T. McCallum

Sylvester Eijffinger's chapter is an interesting and challenging contribution that I enjoyed studying and thinking about. Eijffinger begins by reviewing the standard academic literature on discretionary behaviour, dynamic inconsistency, central bank (CB) independence and so on. In this review he mentions a recent paper of mine that expresses some serious reservations about the literature's basic approach, a topic that I will come back to before concluding these comments.[1] After this review, he introduces and emphasizes the distinction between CB independence and conservativeness, and shows that CB behaviour will – according to the standard approach – depend upon the product $\gamma\varepsilon$, where γ is an index of independence and ε a measure of conservativeness. Next he develops empirical measures of these two characteristics for the member nations of the European Union, excluding Greece, Portugal and Luxembourg. Using the estimated measures of independence, he determines the optimal degree of conservativeness for each nation under present conditions and also *after* monetary unification. The difference in these values stems from the presumption that the extent of CB independence will be different for most nations after unification and the creation of the European Central Bank, so some CBs will not need to be as strongly conservative in order to achieve good monetary performance. Finally, he uses these measures to draw a few conclusions concerning the desirability of including certain nations – Belgium, Finland, Italy and Spain – in the monetary union from its inception, as opposed to beginning with a smaller core group such as Austria, France, Germany and the Netherlands.

Clearly this is a rather ambitious body of analysis, so it is not surprising that I would have a few reservations to express. Let me begin by pretending temporarily that I accept the basic approach of the literature, which Eijffinger relies upon and exploits quite ingeniously – although perhaps not entirely convincingly. The heart of his analysis, which involves the difference between independence and conservativeness, relies on the presumption that there is a distinction between society's

preferences L_t, as given in equation (13), and the central bank's preferences I_t, as given in (14):

$$L_t = \frac{1}{2}\pi_t^2 + \frac{\chi}{2}u_t^2 \tag{13}$$

$$I_t = \frac{(1+\varepsilon)}{2}\pi_t^2 + \frac{\chi}{2}u_t^2 \tag{14}$$

Here π_t denotes inflation, of course, and u_t unemployment. The only difference in the two expressions stems from the presence of $\varepsilon \geqslant 0$ in (14); thus ε is Eijffinger's measure of conservativeness. Independence, by contrast, is measured by γ in his expression (11), which gives preferences that are utilized by the central bank in making monetary policy as a weighted average of the CB's own preferences and those of society:

$$M_t = \gamma I_t + (1-\gamma)L_t \tag{11}$$

Substitution of (13) and (14) into (11) yields

$$M_t = \frac{1+\gamma\varepsilon}{2}\pi^2{}_t + \frac{\chi}{2}u^2{}_t \tag{11'}$$

Now (11') is of precisely the same form as (14) so the product $\gamma\varepsilon$ cannot be distinguished from ε itself, i.e. cannot be identified, on the basis of inflation and unemployment data for a single nation. So Eijffinger has to be rather creative to obtain estimates of both γ and ε for the EMS member nations.

The way he proceeds is to use two different cross-sectional data sets to get estimates of γ alone and $\gamma\varepsilon$. For the former he takes four different measures of central bank independence devised by different researchers, normalizes them to the range zero-to-one, and then averages these four values to get an estimate of γ for each nation. Then to get the product $\gamma\varepsilon$ he uses the theoretical implication that the *optimal* value $\gamma\varepsilon^*$ for a nation depends upon four main determinants including the natural rate of unemployment ($\tilde{u}$), the extent of society's preferences for avoiding unemployment relative to inflation (χ), the variance of productivity[2] shocks ($\sigma_\mu{}^2$), and the slope of the short-run Phillips curve (θ). He devises some proxies for these four determinants and then extracts an estimated expression for $\gamma\varepsilon^*$ by means of a latent variable technique that yields the relation shown in Table 10.1, namely

$$\gamma\varepsilon^* = \underset{(-0.73)}{-0.020\tilde{u}} + \underset{(0.73)}{0.178\chi} + \underset{(0.98)}{0.022\sigma_\mu{}^2} + \underset{(2.44)}{0.752\theta}.$$

Here the terms in parentheses are t ratios and $R^2 = 0.35$. There are some details of the latent variable procedure that are unclear to me on the basis of the chapter's preliminary version. In any event, the main weakness of

this step involves the proxy measures for the right-hand-side variables. For example, the slope of the Phillips curve θ is proxied by the share of employees' compensation in GDP, the magnitude of the preference parameter χ is proxied by the fraction of time that a socialist government has been in power over 1960–93 and so on. In my opinion, these are not very good proxies.

In addition, there is perhaps a minor problem involving the separate estimation of γ. In particular, some of the characteristics used by the different researchers in compiling their measures of central bank independence, measures that he relies upon, seem actually to pertain to conservativeness, rather than independence as here defined. For example, Cukierman's (1992) legal independence index gives a weight of 0.15 to a measure relating to the CB's objectives, with 'price stability' providing a higher score than others. Whether price stability is included among the CB's objectives also figures in the index of Grilli *et al.* (1991). But different objectives imply different values of χ, not γ, so this inclusion undermines the crucial distinction that Eijffinger's analysis is based upon. The quantitative effect is probably small, however.

Now let me turn my attention to the broader question of whether the literature's standard framework is appropriate for analysis of issues of the type under discussion. My objection to this framework is its presumption that CBs will inevitably behave in a manner that is represented analytically by 'discretionary' or 'non-committed' choices. With that form of behaviour, as readers will know, central banks choose their instrument settings on a period-by-period basis, taking expectations regarding the inflation rate as historically given (i.e. predetermined) in each period. But in previous papers I have argued that CBs need not and may not behave in this sub-optimal manner.[3] Despite the absence of any tangible 'pre-commitment technology', a CB can nevertheless achieve better results in terms of its own preferences than those provided by discretionary choices. It can do so by abstaining from the temptation to exploit each period's prevailing expectations, instead choosing instrument settings that would be optimal if expected inflation were equal to the target rate. If a CB were to behave in this way consistently, the target inflation rate would be achieved on average – there would be no inflationary bias – yet the same countercyclical responses would be chosen, so the outcomes would on average be superior. Since there is nothing to prevent any CB from behaving in this 'committed' or 'rule-like' fashion, it is my contention that some forward-looking CBs will in fact do so. But if that is the case, then conclusions based on the stated presumption, that CBs invariably behave in the discretionary manner, will be systematically incorrect. This objection applies to Eijffinger's analysis and also to that of virtually everyone working in this area.[4]

Of course, these analysts are well aware that outcomes would be preferable from a CB's own point of view if it were to behave in a committed fashion, but they contend that actual CBs will not, basically because of the public's understanding of the dynamic inconsistency problem. The difference between their conclusion and mine can be viewed

as resulting from adoption of different 'solution concepts'. Thus the dispute amounts to competing hypotheses about which of these concepts is more appropriate empirically. I will not take the space here to repeat the arguments developed in my previous papers,[5] but it is important to note that my hypothesis implies that there is *not* any necessary trade-off between commitment and flexibility. There is, in other words, no trade-off between average inflation outcomes and the variability of output and employment. That implication is consistent with the empirical findings reported by many analysts, findings that are *inconsistent* with the standard view that I am disputing. It is also of interest to recall that the point of view taken in Kydland and Prescott's original (1977) paper[6] and also in Prescott (1977, p. 33) is basically the same as mine.

Finally, I want to express another disagreement that I have with the standard literature as well as with Eijffinger's chapter. This disagreement involves the notion that it is useful to conduct analysis, and design institutions, under the presumption that CBs can have preferences that are systematically different from society's. This might occasionally be the case in some nations, but on average I would think that the relative importance given to inflation and unemployment will be approximately the same by a central bank and the society of which it is a part. In democracies, CBs will tend to be aware of and reflect the preferences of the population. That tendency might be discouraged or interfered with in various ways, but I would expect that attempts to appoint governors with tastes more anti-inflationary than society's would often result in *ex post* surprises about these governors' tastes, just as American presidents have often been surprised by the decisions of supreme court justices whom they had appointed. As for legislation, I would expect it to be overturned fairly promptly if it were truly inconsistent with the preferences of the nation's population.

In saying this I do *not* mean to suggest that it is pointless or hopeless to have legislative arrangements that assign objectives to CBs; for example, arrangements stating that price level stability or negligible inflation should be the CB's top priority. Quite the contrary: I think that such provisions are desirable and I would, for example, approve of that aspect of the Maastricht Treaty, the price stability bill introduced in 1995 to the US Congress by Senator Mack of Florida and the famous arrangements of the Reserve Bank of New Zealand. But I believe that these are *not* inconsistent with the public's preferences. People do not like unemployment but people also do not like inflation. And in actuality there is no long term trade-off; indeed, given that CBs are able to behave in a committed fashion there is (as stated above) not even any trade-off between average inflation and output or employment variability. Where the CB can differ from the public is in its understanding of what the possibilities are; in its understanding that monetary expansiveness will provide short-lived benefits and long-lasting costs. The CB can and should understand this better than the public at large, and it can and should be able to approach its task in a more patient and far-sighted manner than governmental agencies that are subjected more strongly to day-to-day political

pressures, since these are notoriously impatient and short-sighted. But that is quite a different matter from having *preferences* unlike the public's. Thus I am arguing that there is no reason to expect different preferences and accordingly suggesting that analysis that presumes different preferences is on the wrong track. At the same time, I am supportive of institutional arrangements that assign top CB priority to price level stability, but primarily because of the constraining effect that this will have on governments (rather than central banks). Such arrangements are desirable because they help to reduce short-sighted inflationary pressures coming from branches of government that are more closely involved than CBs in the political process.

NOTES

1 Specifically, McCallum (1995a).
2 Eijffinger follows the literature's standard practice of referring to the macroeconomic system's shocks as productivity or supply shocks, but this seems inappropriate – for such shocks would affect society's optimal rate of output and/or employment.
3 These include, besides the item cited in note 1, McCallum (1995b) and (1995c).
4 Among the major contributions are papers by Rogoff (1985), Canzoneri (1985), Cukierman and Meltzer (1988), Flood and Isard (1989), Cukierman (1992), Lohmann (1992), Persson and Tabellini (1993), Svensson (1995) and Walsh (1995). These build upon the pioneering analysis of 'rules versus discretion' by Kydland and Prescott (1977) and its extension by Barro and Gordon (1983).
5 See McCallum (1995a, pp. 208–9; 1995b, pp. 7–10; 1995c, pp. 31–4).
6 See in particular their concluding section, which states that 'the implication of this analysis is that, until we have [a tested] theory [of economic fluctuations], active stabilization policy may very well be dangerous and it is best that it not be attempted. ... When we do have the prerequisite understanding of the business cycle, the implication of our analysis is that policymakers should follow rules rather than have discretion. The reason is not that they are stupid or evil but, rather, that discretion ... either results in consistent but suboptimal planning or in economic instability.' Instead, it is preferable that 'as Lucas (1976) proposed ... economic theory be used to evaluate policy rules and that one with good operating characteristics be selected' (Kydland and Prescott, 1977, p. 487).

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